

BARRIER FILM DEPOSITION OVER METAL FOR REDUCTION IN METAL  
DISHING AFTER CMP

ABSTRACT OF THE DISCLOSURE

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15 A protective barrier layer, formed of a material such  
as titanium or titanium nitride for which removal by  
chemical mechanical polishing (CMP) is primarily mechanical  
rather than primarily chemical, formed on a conformal  
tungsten layer. During subsequent CMP to pattern the  
tungsten layer, upper topological regions of the protective  
barrier layer (such as those overlying interlevel  
dielectric regions) are removed first, exposing the  
tungsten under those regions to removal, while protective  
barrier layer regions over lower topological regions (such  
as openings within the interlevel dielectric) remain to  
prevent chemical attack of underlying tungsten. CMP  
patterned tungsten is thus substantially planar with the  
interlevel dielectric without dishing, even in large area  
20 tungsten structures such as MOS capacitor structures.